



An assessment of the impact of ethanol-blended petrol on the total NMVOC emissions from road transport in selected countries

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Aim of the study

- ☑ The assessment of the effect of 10% ethanol splash blend in petrol on the evaporative, exhaust and total NMVOC emissions of the vehicle fleet in selected countries



- ☑ Construction of appropriate scenaria (1 baseline, 1 ethanol & 1 ETBE)
- ☑ Compilation of national NMVOC emission inventories with COPERT for the individual countries selected

Input data

- ☑ Activity data (vehicle fleets, mileage) and driving conditions (average speeds) taken from TRENDS
- ☑ Fuel specifications (DVPE, oxygen content, other parameters) depending on the scenario
- ☑ For other variables (climatic conditions, mean trip distance) the default values of the model were used



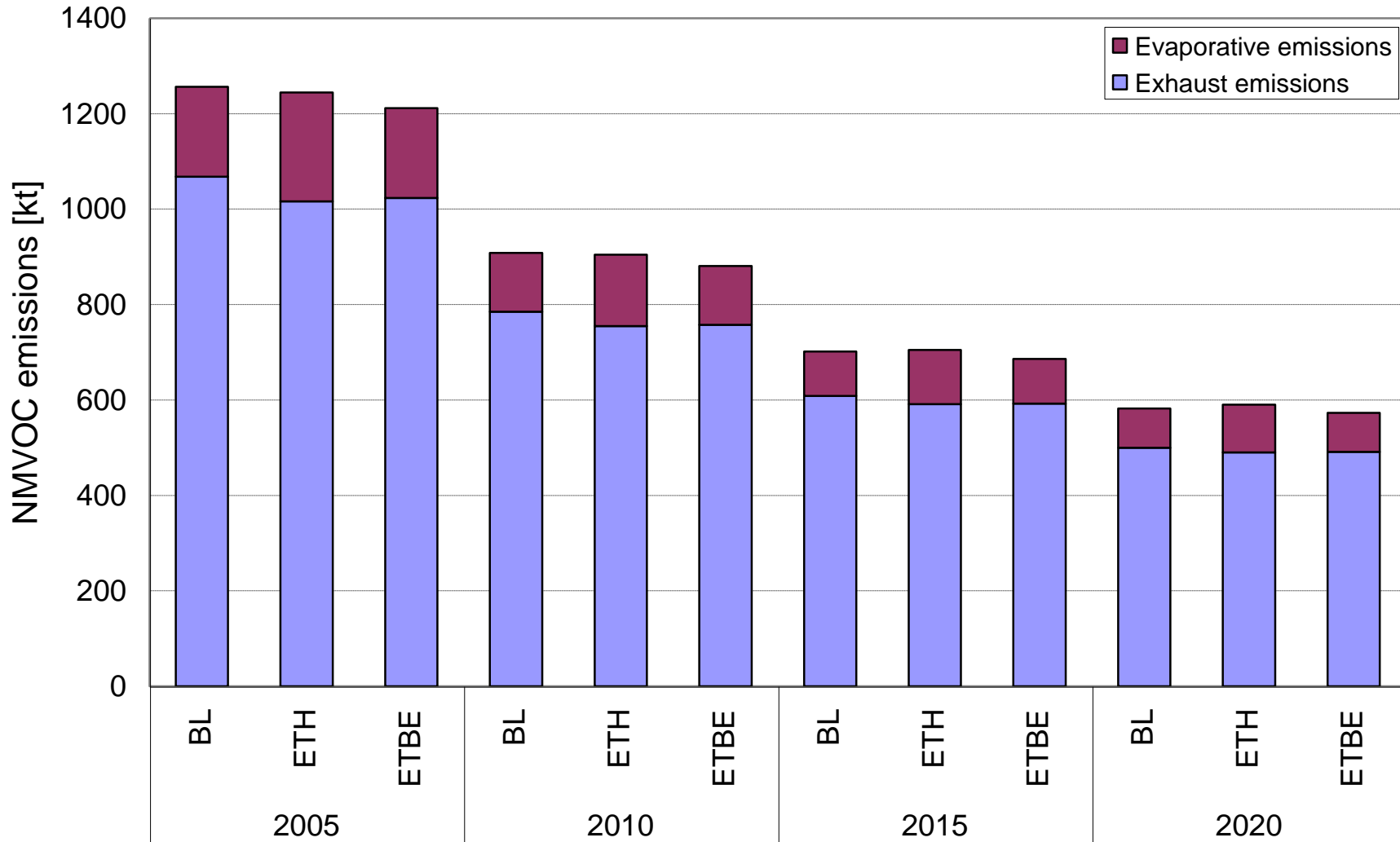
Scenaria

Scenario	Baseline (BL)	Ethanol (ETH)	ETBE
Oxygen content	country-specific statistical data (*)	3.6 % m/m (10 % v/v ethanol)	3.6 % m/m (23 % v/v ETBE)
DVPE	country-specific statistical data (*)	+7 kPa for all 12 months compared to BL	Same as in BL
Aromatics & olefins	country-specific statistical data (*)	Diluted by 10% (the amount of ethanol added) compared to BL	Same as in BL
E100	country-specific statistical data (*)	+5 % for all 12 months compared to BL	+5 % for all 12 months compared to BL
E150	country-specific statistical data (*)	Same as in BL	Same as in BL

(*) Data taken from the 2002 Summary Report of AEA-T on EU Fuel Quality Monitoring, also used in the first annual report of the Commission on the "Quality of gasoline and diesel fuel used for road transport in the EU"



Evolution of NMVOC emissions from road transport for the selected countries (DE, IT, ES, UK)





Projected changes in total, evaporative and exhaust NMVOC emissions (in tonnes) from road transport in 2010

	Total	Evap	Exh	Total	Evap	Exh
	Germany			Italy		
BL	291661	23474	268187	341866	53586	288280
ETH vs BL	-1582	6240	-7822	-4926	11228	-16154
	-0.5%	26.6%	-2.9%	-1.4%	21.0%	-5.6%
ETBE vs BL	-7176	0	-7176	-14675	0	-14675
	-2.5%	0.0%	-2.7%	-4.3%	0.0%	-5.1%
	Spain			UK		
BL	156569	29474	127095	117890	16671	101219
ETH vs BL	1625	5856	-4231	1453	3176	-1723
	1.0%	19.9%	-3.3%	1.2%	19.1%	-1.7%
ETBE vs BL	-3999	0	-3999	-1602	0	-1602
	-2.6%	0.0%	-3.1%	-1.4%	0.0%	-1.6%

Results

- For the considered scenarios (ETH & ETBE) the model predicts the following changes in VOC emissions and their share over the total VOC emissions from all sources:

	Germany 2005...2020	Italy 2005...2020	Spain 2005...2020	UK 2005...2020
Total VOC emissions from all sources	1244...783 kT	1398...738 kT	998...697 kT	1096...870 kT
Total road transport emissions and share	378...190 kT 30...24 %	466...215 kT 33...29 %	219...84 kT 22...12 %	193...93 kT 18...-11%
Ethanol scenario emissions and share	-6.1...+4.1 kT -0.5...+0.5 %	-6.8...-0.2 kT -0.5%...0 %	+1.9...+1.1 kT 0.1...0.2 %	-0.8...+3.0 kT -0.1%...+0.4 %
ETBE scenario emissions and share	-13.5...-1.2 kT -1.1...-0.2 %	-21.5...-7.0 kT -1.5...-1.0 %	-4.1...-0.7 kT -0.4...-0.1 %	-5.6...-0.2 kT -0.5...0 %



Results

- ☒ A ~50% decrease in the evaporative emissions from road transport up to 2020 as compared to the 2005 levels (~90% compared to 1990) is expected due to the combined effect of phasing out older vehicles and the ongoing dieselisation of the European vehicle fleet.
- ☒ The predicted changes in NO_x emissions for the scenarios as compared to the baseline scenario are the following:
 - ☒ Ethanol scenario: -0.3% (in 2005) to ~0% (in 2020)
 - ☒ ETBE scenario: +0.3% (in 2005) to ~0% (in 2020)



Discussion and follow-up

- ☒ On the above results it should be mentioned that:
 - ❖ 10% ethanol or 23% ETBE in all petrol sold in the EU would be excessive to meet the 2010 target – biodiesel will also make a contribution
 - ❖ Exhaust emission reductions are probably underestimated (no oxygen effect in post-Euro II gasoline vehicles)
- ☒ Data on the new Member States (especially fuel-related) need to be collected
- ☒ The effect of fuel permeation needs to be further investigated
- ☒ Evaporative emission factors need to be validated against experimental (SHED) data for modern vehicles